

Claims

- [c1] What is claimed is:
1. An x-ray generator for a CT scanner, the generator comprising:
a slip ring to transfer power to a rotating high voltage (HV) tank;
a rotatable x-ray tube operationally connected to the slip ring to receive power from the HV tank and project x-rays toward a subject to be scanned; and
a stationary inverter to provide AC power to the slip ring for transference to the HV tank.
 - [c2] 2. The x-ray generator of claim 1 wherein the stationary inverter includes a number of power switches arranged in an H-bridge configuration, the configuration having a pair of outputs such that at least one output is connected to a resonant circuit.
 - [c3] 3. The x-ray generator of claim 2 wherein the at least one resonant circuit is connected to the slip ring.
 - [c4] 4. The x-ray generator of claim 3 wherein each resonant circuit includes a capacitor and an inductor connected in series.
 - [c5] 5. The x-ray generator of claim 2 wherein the at least one resonant circuits is connected to inputs of a transformer and wherein the transformer has outputs connected to the slip ring.
 - [c6] 6. The x-ray generator of claim 5 wherein the transformer has a turns ratio of 1:N and a transformer of the high voltage tank has a turns ratio of 1:X-N.

- [c7] 7. The x-ray generator of claim 6 wherein the slip ring has an effective inductance of Y/N^2 .
- [c8] 8. A CT imager comprising:
a rotatable gantry having an imaging bore disposed therethrough, and a stationary base supporting the gantry;
a slip ring disposed in the rotatable gantry and electrically connected to an x-ray tube and a HV tank, the HV tank designed to apply a HV potential to the x-ray tube; and
a power conditioner external to the gantry to receive a DC voltage and generate an AC voltage waveform that is applied to the HV tank through the slip ring.
- [c9] 9. The CT imager of claim 8 further comprising a power distribution unit (PDU) disposed in the stationary base and wherein the power conditioner is disposed in the PDU.
- [c10] 10. The CT imager of claim 8 wherein the power conditioner is positioned in the stationary base.
- [c11] 11. The CT imager of claim 8 wherein the power conditioner includes an inverter, the inverter configured to supply an approximate $20k-1$ MHz AC waveform to the slip ring.
- [c12] 12. The CT imager of claim 11 wherein the HV tank is configured to receive the AC waveform from the slip ring and transform the AC waveform to generate up to approximately 160 kV therefrom.

- [c13] 13. The CT imager of claim 11 further comprising at least one series-resonant circuit placed in line between an inverter output and the slip ring.
- [c14] 14. The CT imager of claim 13 wherein the at least one resonant circuit is configured to limit frequency content of current and voltage waveforms on the slip ring.
- [c15] 15. The CT imager of claim 13 further comprising a transformer connected between the at least one series-resonant circuit and the slip ring.
- [c16] 16. The CT imager of claim 15 wherein the transformer has a turns ratio of 1:N and wherein a transformer of the high voltage tank has a turns ratio of 1:X-N.
- [c17] 17. The CT imager of claim 16 wherein the slip ring has an effective inductance of Y/N^2 .
- [c18] 18. A CT scanner comprising:
a rotatable x-ray tube and a rotatable HV tank, the HV tank configured to apply a high voltage potential to the x-ray tube;
a slip ring to transfer current to the HV tank;
a stationary base having an inverter to supply AC power to the slip ring for transference to the HV tank; and
the inverter having at least one resonant circuit connected to the slip ring.
- [c19] 19. The CT scanner of claim 18 wherein the inverter includes a

transformer connected to the at least one resonant circuit and the slip ring.

- [c20] 20. The CT scanner of claim 18 wherein the at least one resonant circuit includes a pair of resonant circuits.
- [c21] 21. The CT scanner of claim 18 having a gantry rotatable at a speed of approximately 0.1 to 0.3 seconds per revolution.
- [c22] 22. The CT scanner of claim 18 having a power generator configured to provide at least 100 kW of power.
- [c23] 23. The CT scanner of claim 18 further comprising a power distribution unit having the inverter disposed therein.
- [c24] 24. The CT scanner of claim 18 incorporated into one of a medical imaging machine and a parcel inspection apparatus.